WHAT IS CLAIMED IS:

1. An image processing apparatus, comprising:

transformation means for transforming data space of an input image to multi-resolution space and outputting a multi-resolution representation of the input image;

detecting means for detecting a singularity in the input image;

extracting means for extracting a local pattern, which is formed by a spatial arrangement of intensities of the multi-resolution representation in a partial area containing the detected singularity, with regard to partial areas of a plurality of sizes;

quantizing means for creating a quantization code book based upon the extracted local pattern and replacing said multi-resolution representation by a code word using the code book; and

encoding means for algebraic encoding code data which includes position coordinates of the singularity in said multi-resolution representation and the code word provided by said quantizing means.

2. The apparatus according to claim 1, further comprising counting means for counting frequency of occurrence of said local pattern, wherein said quantizing means creates a code book based upon results

of counting performed by said counting means.

3. The apparatus according to claim 2, further comprising structuring means for detecting an inclusion relation of any two representative vectors that have been registered in said code book, and structuring said code book.

4. The apparatus according to claim 3, further comprising:

memory means for storing degree of conformity or quantization error, calculated by said quantizing means, when the local pattern is allocated to a representative vector; and

deciding means which, on the basis of the degree of conformity or quantization error, is for deciding the order relating to the perspective depth between any two representative vectors contained in the code data;

wherein said encoding means encodes the order relating to the perspective depth.

5. An image processing apparatus comprising the image processing apparatus described in claim 4, wherein said image processing apparatus is applied to image recognition to retrieve image data from a partial image.

6. An image processing apparatus comprising:

decoding means for decoding a code generated by the

image processing apparatus described in claim 4;

inverse quantizing means for generating a local pattern from a code word contained in code data decoded by said decoding means; and

synthesizing means for combining a plurality of local patterns, which have been generated by said inverse quantizing means, based upon position coordinates of a singularity decoded by said decoding means, and order information relating to depth of a plurality of representative vectors.

7. The apparatus according to claim 6, further comprising memory means for storing code data generated by the image processing apparatus described in claim 1, and outputting the code data stored in said memory means to said decoding means.

8. An image processing method, comprising:

a transformation step of transforming data space of an input image to multi-resolution space and outputting a multi-resolution representation of the input image;

a detecting step of detecting a singularity in the input image;

an extracting step of extracting a local pattern, which is formed by a spatial array of intensities of said multi-resolution representation in a partial area

containing the detected singularity, with regard to partial areas of a plurality of sizes;

a quantizing step of creating a quantization code book based upon the extracted local pattern and replacing said multi-resolution representation by a code word using the code book; and

an encoding step of algebraically encoding code data which includes position coordinates of the singularity in said multi-resolution representation and the code word obtained at said quantizing step.

9. The method according to claim 8, further comprising a counting step of counting frequency of occurrence of said local pattern, wherein said quantizing step creates a code book based upon results of counting obtained at said counting step.

10. The method according to claim 9, further comprising a structuring step of detecting an inclusion relation of any two representative vectors that have been registered in said code book, and structuring said code book.

11. The method according to claim 9, further comprising:

a calculating step of calculating, at said quantization step, degree of conformity or quantization error when the local pattern is allocated to a

representative vector; and

a deciding step which, on the basis of the degree of conformity or quantization error, is for deciding the order relating to the perspective depth between any two representative vectors contained in the code data;

wherein said encoding step encodes the order relating to the perspective depth.

12. The method according to claim 11, further comprising:

a decoding step of decoding a code encoded at said encoding step;

an inverse quantizing step of generating a local pattern from a code word contained in code data decoded at said decoding step; and

a synthesizing step of combining a plurality of local patterns, which have been generated at said inverse quantizing step, based upon position coordinates of a singularity decoded at said decoding step, and order information relating to perspective depth of a plurality of representative vectors.

13. An image processing apparatus comprising:

input means for entering an image;

transformation means for transforming data of the input image, which is represented by a function on a

two-dimensional plane entered by said input means, to data of a vector field;

detecting means for detecting a pole and a zero point of image data transformed by said transformation means;

arithmetic means for calculating a finite number of expansion coefficients of a polynomial expansion about the pole detected by said detecting means; and

deciding means which, based upon the position of each pole detected by said detecting means, is for deciding an area in which a polynomial expansion of finite degree obtained by said arithmetic means about each pole can be approximated.

14. The apparatus according to claim 13, wherein said detecting means detects the pole and zero point by the argument principle.

15. The apparatus according to claim 13, further comprising calculating means for calculating amount of control of an input parameter of said input means based upon the pole.

16. The apparatus according to claim 15, wherein said input means has a wide-view lens and an array sensor and controls angle of rotation of an optic axis based upon the amount of control.

17. An image processing method comprising:

an input step of entering an image;

a transformation step of transforming data of the input image, which is represented by a function on a two-dimensional plane entered at said input step, to data of a vector field;

a detecting step of detecting a pole and a zero point of image data transformed at said transformation step;

an arithmetic step of calculating a finite number of expansion coefficients of a polynomial expansion about the pole detected at said detecting step; and

a deciding step which, based upon the position of each pole detected at said detecting step, is for deciding an area in which a polynomial expansion of finite degree obtained at said arithmetic step about each pole can be approximated.

18. The apparatus according to claim 13, further comprising a calculating step of calculating amount of control of an input parameter of said input step based upon the pole.